

POSTER DESIGN USING COREL DRAW

How to use this booklet:

This booklet offers a tutorial in the design of 2 alternative styles of poster, which range in complexity between basic and an advanced skill level.

Consider your experience with the software and decide which design tutorial will suit your own development. Example files of both posters will be available from the web address given below, so that you will be able to either start from the basic example or move forward in the booklet to the advanced method on page 22.

Please note that there may be tips and tricks explained in all sections in this booklet that will be of use to students of all skill levels.



- this icon indicates exercise instructions to follow.

Contents:

Section	Page
Software background	2
Basic poster design	4
Advanced poster design	22

Useful information:

Department of Biology IT Support	- http://www.york.ac.uk/depts/biol/itsupport/guides/corel/corel.htm email - biolhelp@york.ac.uk
Department of Biology Graphics Office	- http://www.york.ac.uk/biology/graphics/ email - biol-graphics@york.ac.uk - colour swatches are available to view in the graphics office
Working files can be downloaded from	- http://www.york.ac.uk/biology/graphics/training.htm or - T:/resources/ptr2/PhD Poster Training/

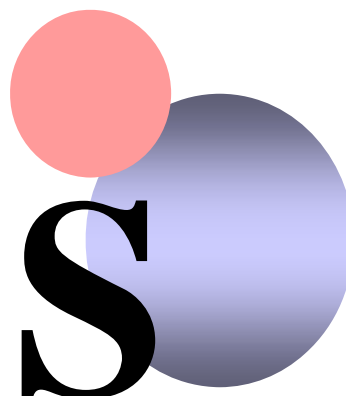
Software background - Corel Draw

Corel Draw has been on the market since 1989 and is an industry leader in PC graphics and illustration. Corel Draw is part of a Graphics Suite: Corel DRAW® for vector illustration and page layout; Corel PHOTO-PAINT® for professional digital imaging. These two software applications have been available on the University of York's network for use by staff and students for many years and prove to be professional creation tools for design jobs from basic illustration to high quality Desktop publishing. *NOTE - This booklet focuses on using Corel Draw to produce large scale posters.*

Corel Draw is a 'vector' based drawing package, as apposed to a 'bitmap' based package. Vector drawing packages work with mathematical precision, using coordinates and equations to plot a diagram, create and layer shapes, and colour and pattern shapes. The benefit of this approach is that when printing a vector document, the print image is always sharp. If you need to scale the print up or down this is not a problem as it will still print as a sharp image. This is a perfect tool for drawing logos and illustrations which may be required to be printed at many different scales.

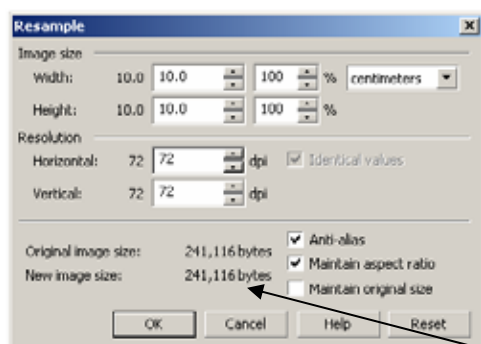


Bitmap

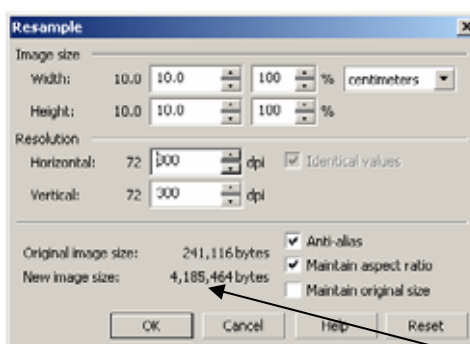


Vector shapes

Corel Photopaint is a Bitmap editing package and images are subject to resolution. Bitmaps are drawn by pixels; tiny squares of colour on screen. With a bitmap you can select a resolution by setting it's DPI (Dots Per Inch), which then defines the use of the image – if the image is to be used on the web or viewed on-screen only, you can set a low DPI, usually 72dpi. If the image is required for high quality printing, the resolution should be at least 300dpi at the physical size the image will be printed e.g. an image printed at 10cm x 10cm should have 300dpi, making a high file size, which is comparable to a low file size of a screen displayed image of the same dimensions but lower resolution. See examples below:



low file size



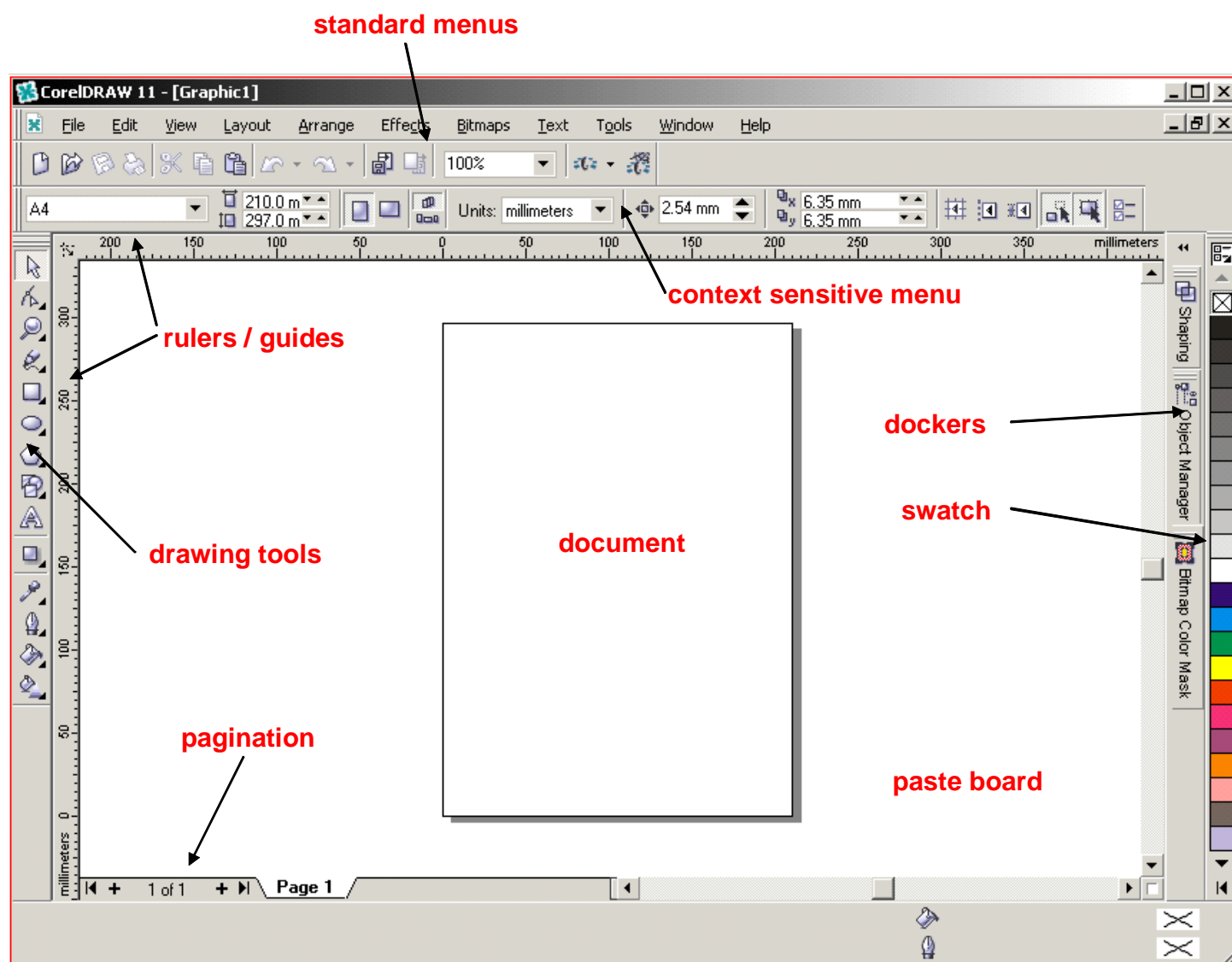
high file size

There are other vector drawing packages available on the market. Along with Corel Draw other industry leaders are Freehand, which was previously marketed by Macromedia (now part of Adobe software) whose future is now unclear and Adobe Illustrator as well as others. Each package has its own benefits of use and this user has no current preference, e.g. Corel Draw is capable of creating multi-page documents where Illustrator is not, where as Illustrator has more intuitive keyboard shortcuts (for this user anyway).

It has been traditional for this department to use the Corel Draw software to create posters due to its more robust nature during production and printing. The software does demand a lot of resources from your computer during the design process, but this is supported by its automated back-up feature, which saves a copy of the document at regular intervals and allows some peace of mind if your computer does crash. This history with Corel Draw also means there are key members of staff within the department who are able to support any query with either the technical setup or use of this software.

The printing process can be straightforward or difficult depending on the origin of the file. There are differing operating systems available for many brands of computers, each of which may have varying capabilities and non-standard resources e.g. fonts. The designer (yourself) may add images and charts to a poster from a variety of sources, which can make it difficult for the Corel software to resolve during printing. The good point here is that Corel Draw has many features that allow the document to be printed or exported as expected by the designer, usually allowing for many 'escape plans' if the software fails to print in its native format (.cdr). This is comparable to PowerPoint which is also used within this University to create posters, but which is not designed specifically for that task. PowerPoint allows very few options when it fails to print in its native format (.ppt), and regularly PowerPoint fails to print complex designs, especially when used to create posters of a non-standard size over A0. With the tight demands on your time, it's 'upsetting' for you to spend many design hours on a poster which then fails to print.

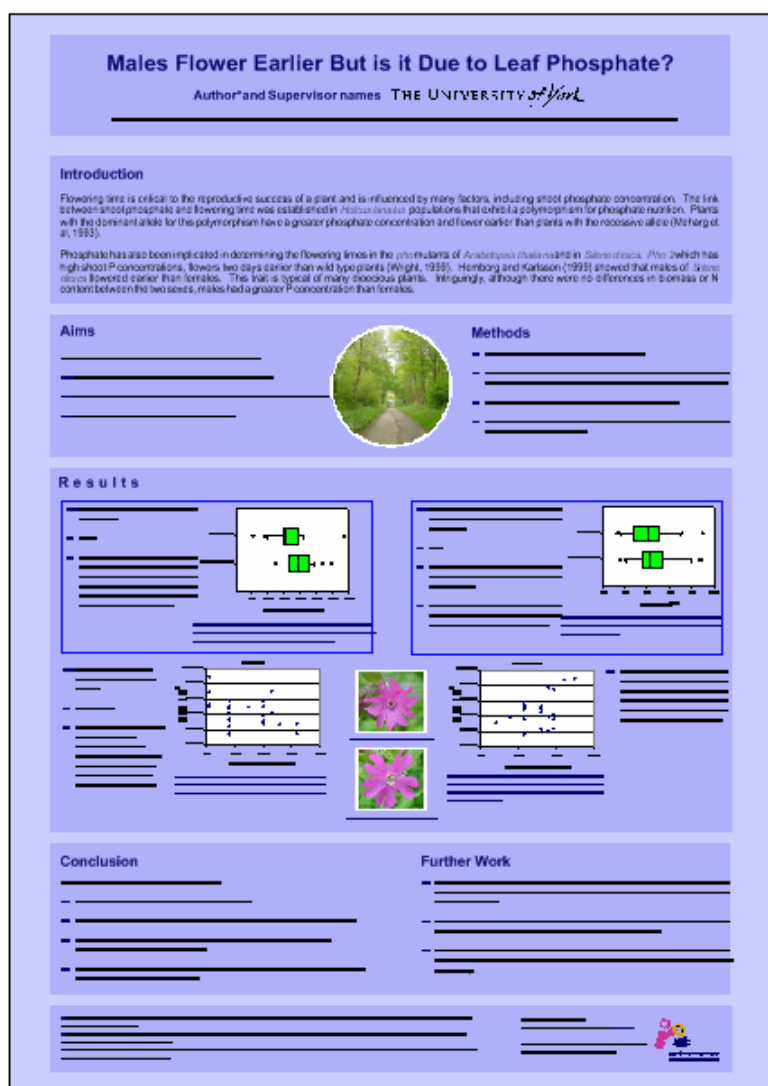
The Corel Draw Work Space:



BASIC POSTER DESIGN

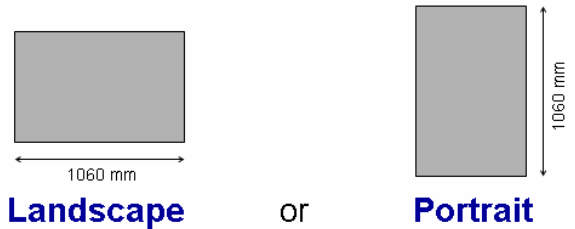
This first tutorial of poster design covers the basic options:

1.	Planning your poster	5
2.	Creating and saving a Corel Draw file	6
	a. Setting the document dimensions	6
	b. Auto backup	6
	c. Quickcorrect / Spell check	7
3.	Preparing the background	8
4.	Using Guides and Dummies for margins and column layout	8
5.	Adding column colouring	12
6.	Text preparation and inserting	13
	a. Titles	13
	b. Sub-titles	14
	c. Body Text	14
7.	Adding images and logos	16
8.	Final checks	21

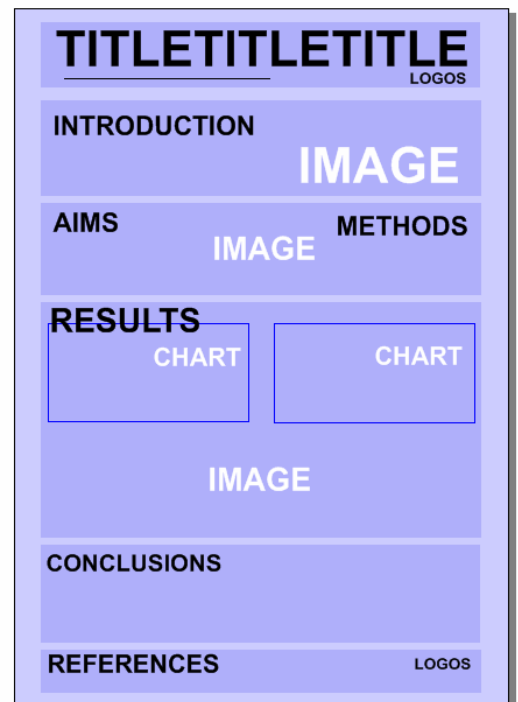


1. PLANNING YOUR POSTER

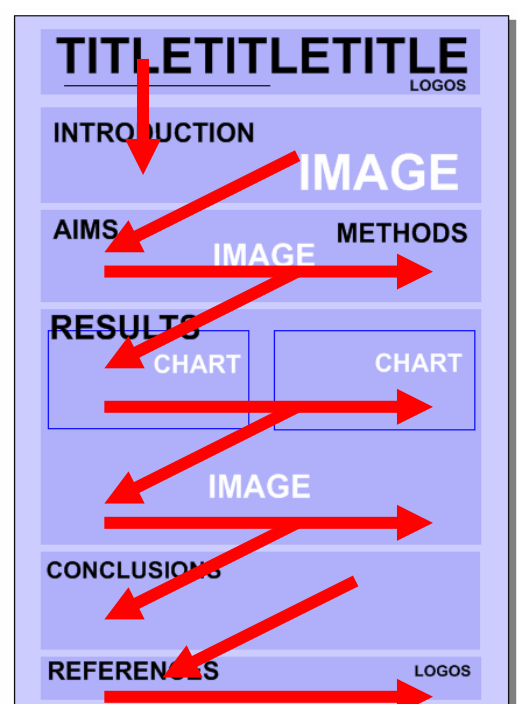
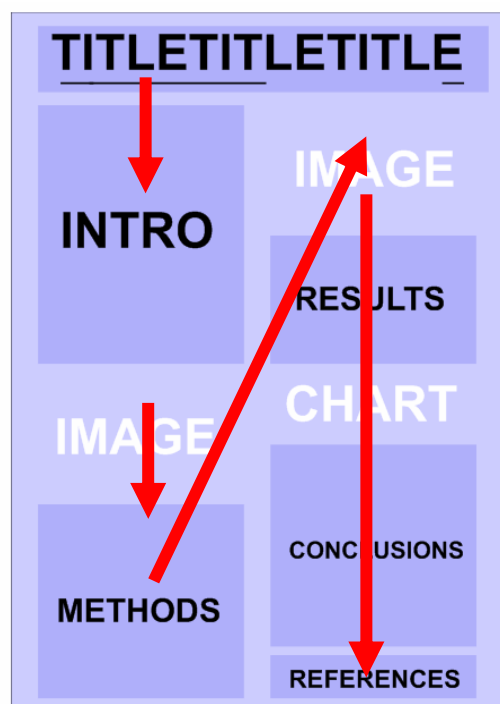
This first example is taken from an actual PhD submission and covers all the basic requirements for the task. When you are first given the task of preparing a poster, you should go through a stage of considering its purpose/message. Consider your research and discuss with your supervisor. Then plan the poster out, this can be done simply by scribbling ideas onto an A4 sheet of paper, which will represent the dimensions and orientation of your finished poster. An important consideration is to check where and how the poster will be displayed. This can be on poster boards of varying sizes, so it is clearly important to check whether your poster needs to be landscape or portrait to fit the display board. Check your deadlines and availability of your printer.



Below are two examples of how a poster could be planned. The example on the right is the layout for the poster we will prepare in this section.



These two posters vary in the direction they are read (red lines). Make sure your poster reads easily.



2. CREATING AND SAVING A COREL DRAW FILE

The next step is to start working with Corel Draw. The software is available on the Teaching computers within the department, via the Novel Network application launcher – or in some cases from the ‘Start’ menu of those computers. To use the Novel Launcher:



If the Novel application launcher is not available on screen by default when you log in, follow these instructions

1. click on your start menu – navigate to and select: Programs|Start up| Application Launcher
2. in the left window select ‘Graphics’
3. in the right window double click on the ‘Corel’ folder
4. Double click on the ‘Corel Draw’ icon
5. This will either install the software or start the software for use.

Once you have the Corel Draw software open on your computer, open a new file:

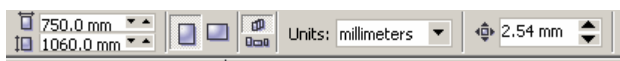


1. select ‘File|New or click the  new file icon


2.a. SETTING THE DOCUMENT DIMENSIONS

Now you have a new page to work on, we will set it's dimensions:



1.  This is a part of the ‘Property menu’ from the top of the workspace. The first two boxes on the left of the menu allow you to set height and width measurements for the document. In the top box (width) type 750mm, and in the bottom box type 1060mm. These dimensions given are the most economical for the Graphics Office to print. Always check costs before committing yourself to a print size.

You can see that the two orientation buttons make it easy to change the orientation of the document. If you are not used to working in millimeters, you can change the Units to something you are more comfortable with.

The last box on the right of this menu is for the ‘Nudge’ option. This is a very good tool for moving objects, text or pictures around your document in fine or large increments, by selecting the object with the ‘Pick tool’  and then using the arrow keys on your keyboard to ‘nudge’ the object into alignment with another object or guide.

3. Now save your document, select ‘File|Save’, use the dialogue box to save the file in an area that you have full access to (do not save to the hard drive of the computer you are working on). Give the file a sensible name so that it relates to your research, has a date associated with it and also add your name/username in case the file has to be sent anywhere for printing (e.g. the Graphics Office). If you do this correctly it can save time with lost files and later with communication between yourself and the printer.

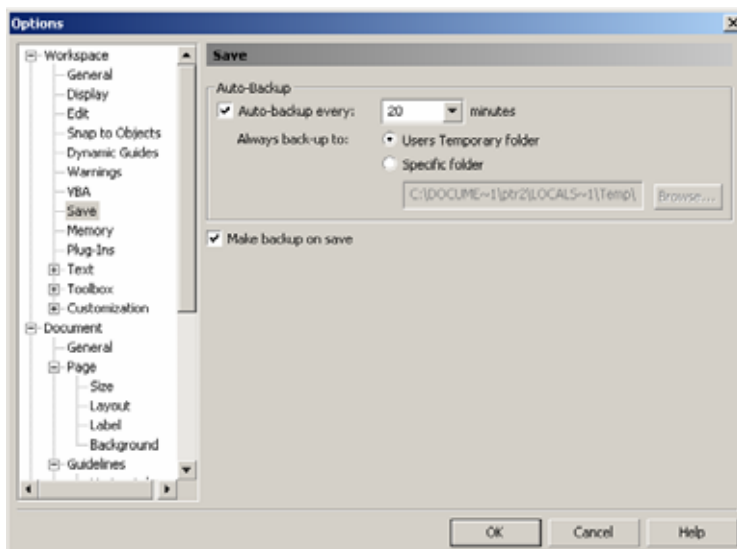
2.b. Auto backup

Corel Draw has an Auto Backup feature, which can cause confusion if you are not aware of it. It may have been altered on the computer you are using, but it has a preset time e.g. every 20 minutes, where it will automatically save your document to a preset area. Depending on the power of your computer, this operation can lock up the system and make it appear a crash is taking place. Allow a few moments for it to finish what it is doing and your system may restore itself to full usability. It is a useful feature, as crashes can happen with complex files and on computers with low operational power/memory.

How to access Auto Backup:



1. select 'Tools|Options'
2. use the left panel of the dialogue box, and select from the tree 'Workspace|Save'
3. On the right hand side you can select the options best for your project.



the 'Options' Dialogue box

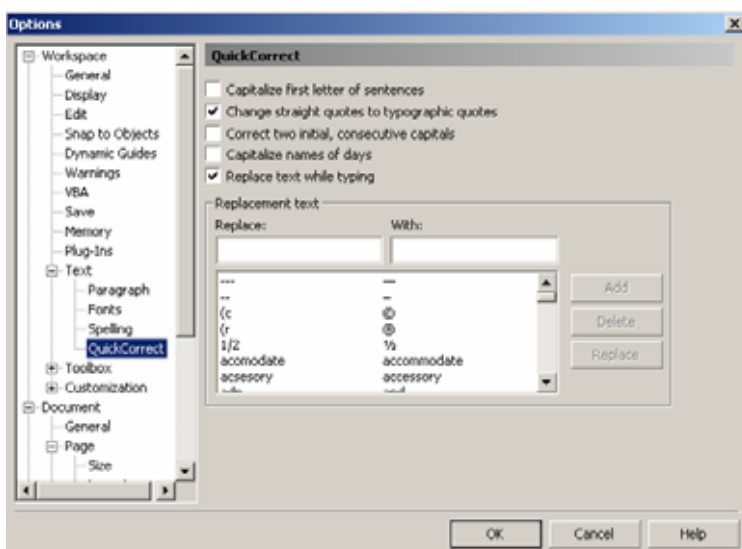
IMPORTANT NOTE – even though there is a back-up feature, it is wise to save your file at regular intervals, especially if you have made complex changes or additions to the design.

2.c. QUICKCORRECT / SPELLCHECK

In the same area dialogue box, you can set options for the Spell Checker and Quickcorrect. The Quickcorrect option can cause problems, so it is good to address the problem before going further with the project. This option is automatically selected not to allow more than one capital letter in a word, so if you want to type a postcode e.g. YO10 5YW, the Auto letter corrector will force it to look like this Yo10 5Yw, not ideal – this may also cause problems when labeling diagrams/images/charts.



1. select 'Tools|Options'
2. use the left panel of the dialogue box, and select from the tree 'Workspace|Text|QuickCorrect'
3. On the right hand side, untick the 'correct two initial, consecutive capitals' option
4. read the rest of the options and select only the options you require.
5. the spellchecker is the option in the left panel of the dialogue box, which is above the QuickCorrect option, select this option but do not change anything – just familiarize yourself with its capabilities.



3. PREPARING THE BACKGROUND

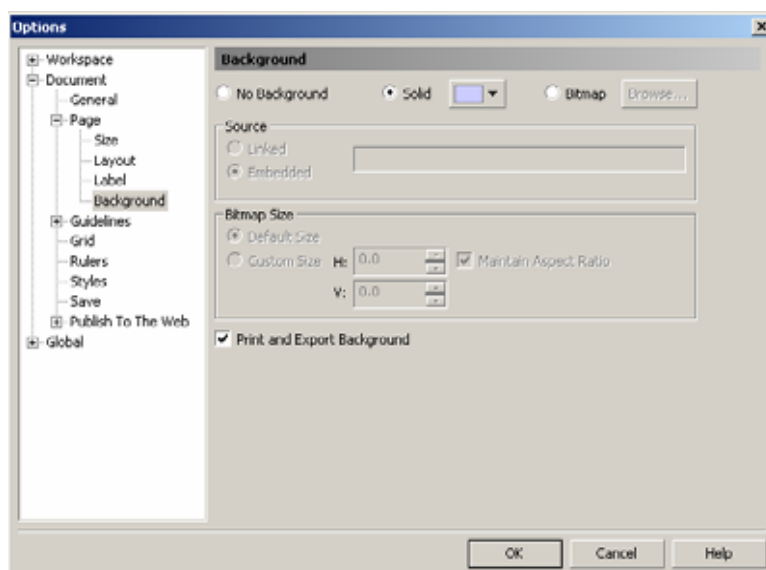
Now we can continue with the design for our poster. The poster is built up in layers (NOTE Corel Draw does have a Layers feature which we are not using in this tutorial) and we start with the base layer, the background. The base colour of the document can be set using the Page background menu item.



1. select 'Layout|Page Background'

you can see that Corel Draw then opens the 'Options' dialogue box again at the correct place to edit the documents background colour.


2. Select 'Solid' and choose a colour of your choice from the drop down menu
3. Select OK and the background of your poster is updated.



4. USING GUIDES AND DUMMIES FOR MARGINS AND COLUMN LAYOUT

The next layer of the poster to add is the title and column background colours. We need to set guides on the poster so that we can align all the content neatly. When a poster is printed at full scale any imperfections in alignment become magnified. Corel Draw has a selection of features that make planning out posters easier: 'snap to grid'; 'guidelines'; 'snap to guides' and the 'Align and Distribute' tool.

In this tutorial we will use Guidelines. We will also use a common designers trick - 'dummie' objects.

Guidelines can be utilised by clicking on either the left or top ruler (refer to the workspace diagram on page 3) in the workspace, holding the left mouse button down and dragging toward the centre of the screen. You will see a red guide line being dragged, you can select and drag this guideline to the position of your choice. They are blue when not selected, and red when selected. They can be moved by using the 'Pick tool'  and also by using the arrow keys 'Nudge' feature. If selected, you can click on them again which will add rotation icons, which allow you to have an angled guide, use the 'Control' key on your keyboard during rotation to constrain the angle to standard degree settings e.g. 30°, 45°, 90°, etc.

Make sure guidelines are visible:



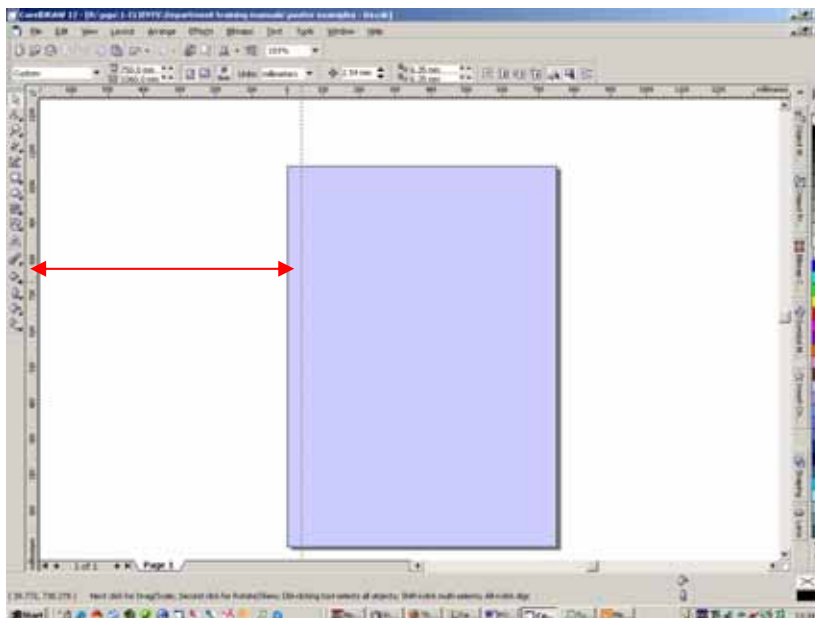
1. Select 'View' from the main menu, and select 'Guidelines' (ticked)

Dummies are shapes drawn by the designer which are used purely for construction purposes and then deleted afterward; in this case they are not a part of the finished design. They can be used as invisible objects with no colour in a design to force text to flow in a certain direction. We will use a dummy to measure the placement of our guidelines.

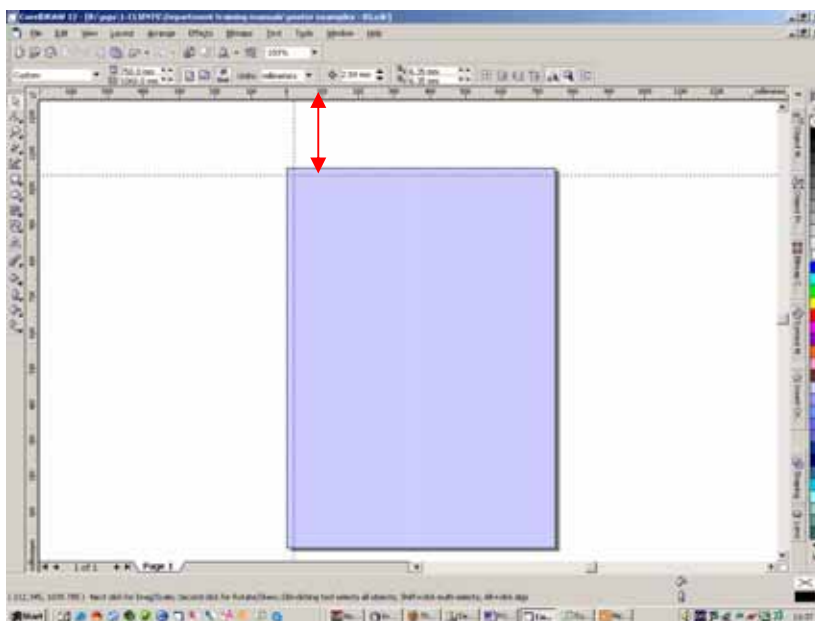
On your poster follow these instructions to create the column layout



1. Click on the left vertical ruler, hold the left mouse button down and drag a guide toward the centre of your document. Place it toward the edge of the left hand side of your poster.



2. Do the same again, this time dragging from the top horizontal ruler to the top edge of the poster.




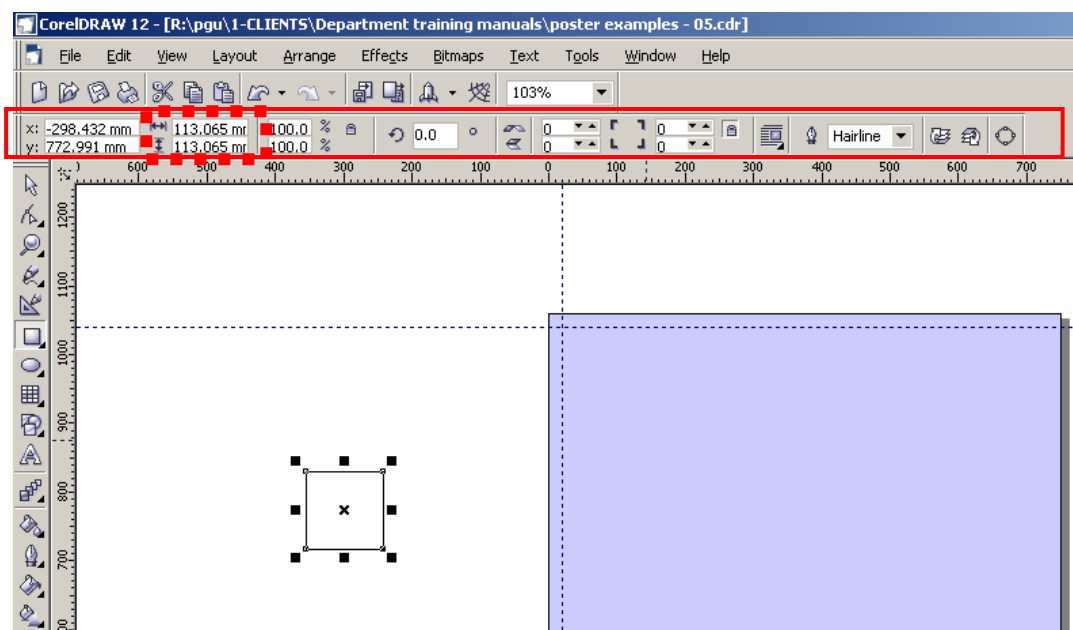
We will now create a dummy object, which we will use to place all our guides at precise points on our poster.



3. Select the 'Rectangle tool' from the Toolbox (left hand side of workspace). Click on the 'Pasteboard', hold down the Control key on your keyboard and drag a constrained square. While it is still selected (it is highlighted with square anchor points at its four corners and central spot marked

with a cross). We can set its dimensions using the context sensitive menu which is now available across the top of the screen.

If the drawn square becomes deselected, before you have completed these instructions you can reselect it using the  'Pick tool'.

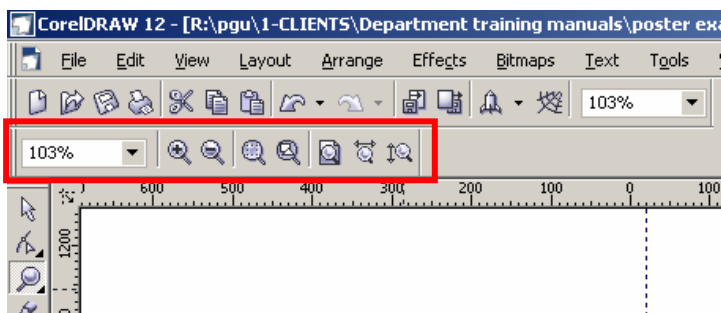


change the dimensions to 20mm width by 20mm height.

4. With the new 20x20mm square selected, click on a bright colour from the swatch on the right hand side of the screen. A garish colour is better as this stands out and means you should be able to find the object easily when needed.

Using this dummy and the 'Zoom' tool  and 'Pick' tool  we can proceed to place our guidelines.

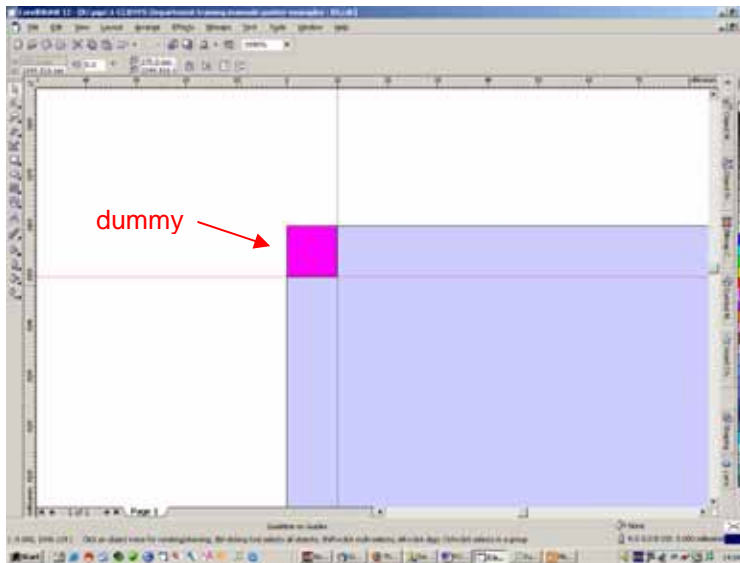
5. Use the zoom tool to zoom to the top-left corner of your poster: with the zoom tool selected, click and drag a lasso across this corner of your poster – when you click and drag the 'Pick' tool on a clear area of the workspace a dotted selection line is drawn, this can have various names but a common one is 'lassoo', and it can be used to select objects in Corel Draw. The screen will zoom to that point. You can left click the tool on the workspace and the screen will zoom out. Also note the context sensitive menu for the zoom tool at the top of the screen, which has quick features to zoom in and out to page dimensions on the click of a button.



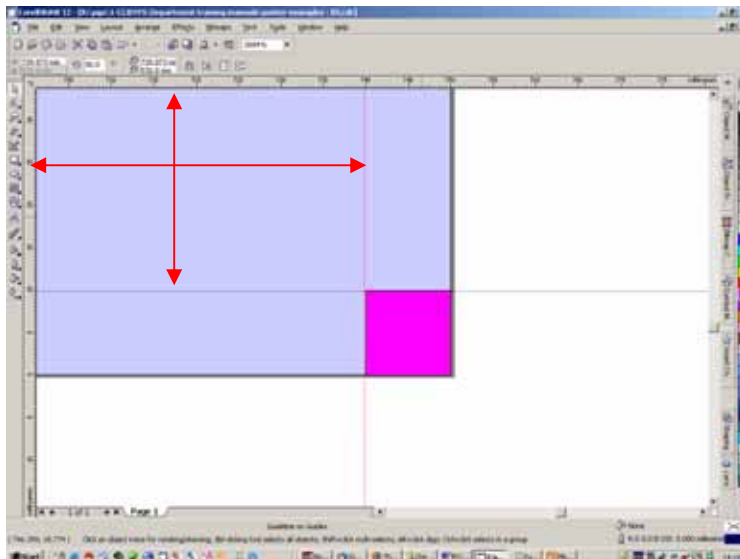
now we are zoomed into the poster, use the 'pick' tool and place the dummy object over the corner of the poster.

6. Now select and drag the guidelines we've drawn and place them on the edge of the dummy object.

This dummy can be used again by placing it on the left hand bottom edge of the poster



7. Using the same method, use the dummy to add a right hand side guideline and horizontal page footer guideline.





This method gives you practice using the zoom tool and is very precise. We can now use this method to map out the whole poster. So far we have added an all round 20mm margin for the poster. We now have to add the guides for the columns and text margins.

5. ADDING COLUMN COLOURING


Using the previous method, we will follow the diagram below to add section boxes to your poster and also add the 10mm margins within these boxes, which will be the inner margins for text boxes.

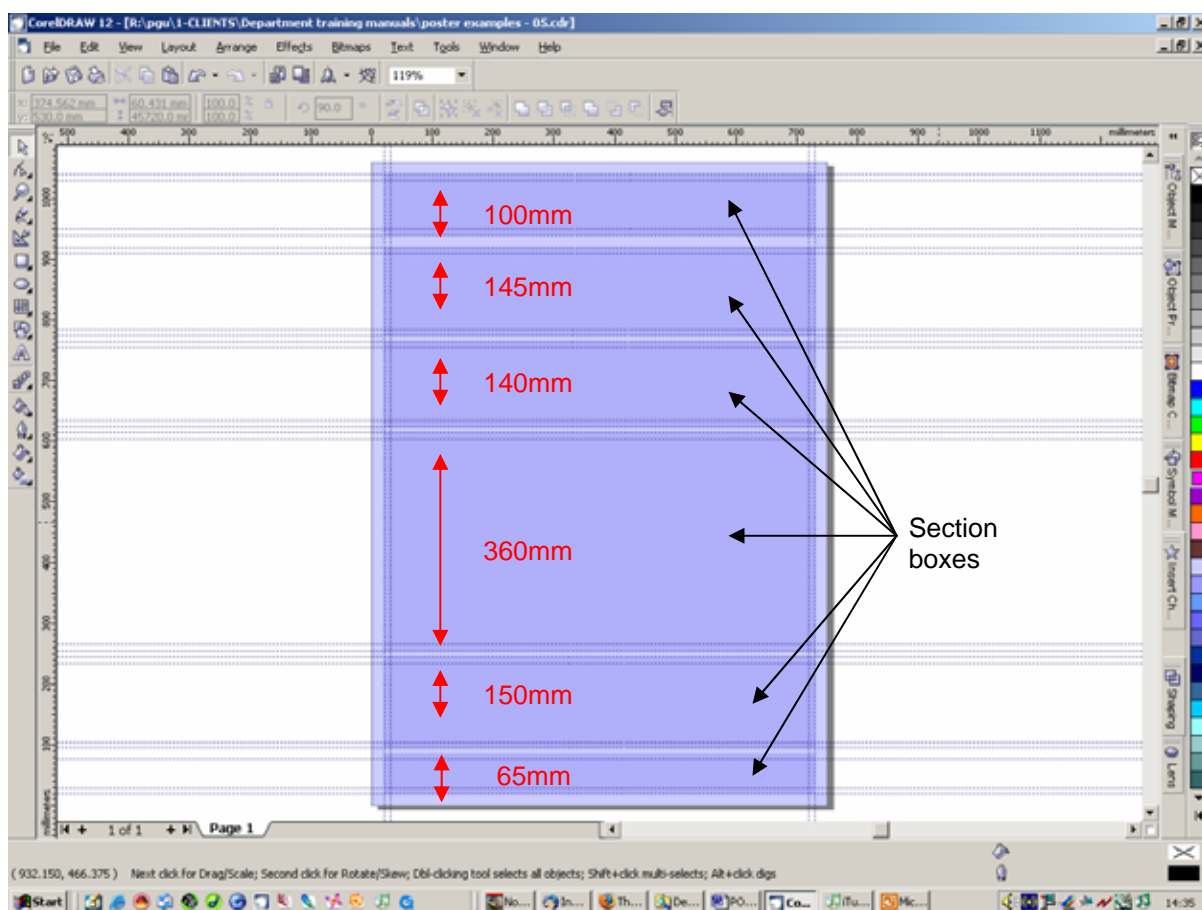


1. Start by working from the top left area of your poster, adding the section boxes drawn by using the 'rectangle' tool , the widths fit our previous margins and the heights are given below. Give them a colour of your choice by selecting them with the 'pick' tool  and clicking on a colour in the swatch (right of workspace).

There is 10mm of vertical space between each box.

Use a dummy object of 10mm x 10mm, to add space between the section boxes, use the guidelines, which can be found by clicking and dragging from the 'rulers' on the left and top of the workspace.

To ease design don't forget to use your 'zoom' tool  to zoom in and out (left and right mouse click respectively) of your poster to make precise edits.



This completes the background to the poster; we can now begin to add the text, images and charts.

For the following exercises all the text and images can be found at this web address:

<http://www.york.ac.uk/biology/graphics/training.htm> or on the network T:/resources/ptr2/PhD Poster Training/


For the web link: Select files from the list on the web page, Word files and PDFs will allow you to save them directly to a working space. Images will open in a new window and will require you to right click on the image select 'save image as' and save it to an easily accessible personal file space.

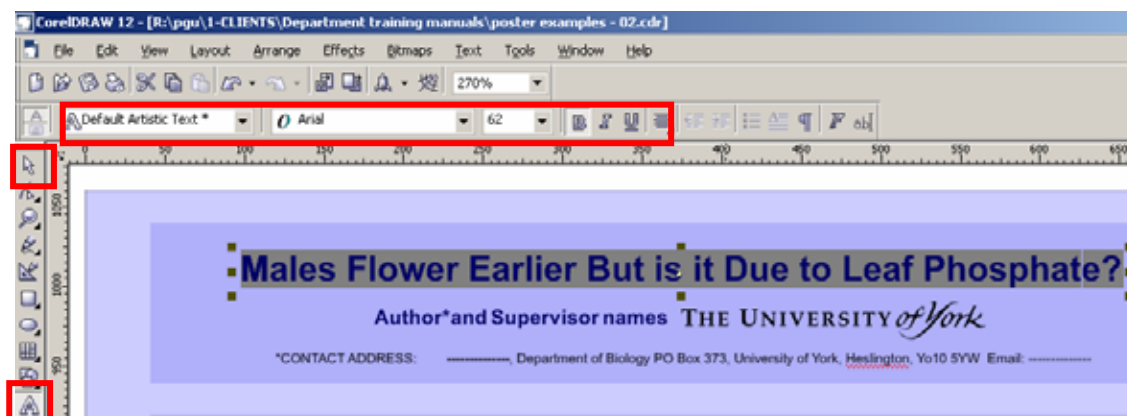
6 . TEXT PREPARATION AND INSERTING

The text for your poster can be typed in Microsoft WORD (or which ever application you prefer), this can make the job easier as you might use WORD more frequently for writing and keeping records. It also has clear abilities for spell checking and word counting. WORD documents can be more portable and accessible making it easier to send to your supervisor or colleagues for checking.

6.a. TITLES

Titles need to be a large font size, as they need to attract the attention of passers by. If the title is big enough and can be read from across a room, it could attract people to your poster where others are ignored. The minimum font size we will recommend is 36pt, but a font size of 70pt, 100pt or even 200pt will improve legibility from a distance. Make it fill as much space as possible and is tasteful.

1. From the web or network link (instructions top of page) Open the Word document 'training_poster_text.doc' ready to copy text to your Corel Draw file.
2. To add the title to our example poster, select and 'Copy' the title from the WORD document 'Males Flower Earlier But is it Due to Leaf Phosphate?'
2. and then working in Corel draw, select the 'Text' tool  from the Tool box on the left of the Corel workspace, click in pasteboard area of the work space so you can see a cursor flashing, it does not matter where you click so long as it's a clear area away from a box. Then 'Paste' the title into the document.
3. You can now either select the text with the 'Text' tool or the 'Pick' tool. While it is selected the 'Context sensitive' menu allows options to edit the text. Make sure that font used is Arial, Bold and that the font size is 62pt. Then drag and place it onto the top section box using the 'Pick' tool. Try to place it central horizontally on the document, use a guideline to be precise.



NOTE: In Corel Draw you have to be careful as when you click on a box with the 'text' tool, it may turn that box into a joined drawing object and text box, which isn't always helpful.

4. You can fill in the rest of this section box with the 'Author and supervisor', font size 36pt note and the 'Contact details', font size 24pt. (as above diagram) – The University of York logo will come later.

6.b. SUB-TITLES

A quick note on sub-titles – they can be added in the same way as the Main Title, and placed carefully in the correct section. Font sizes should be bigger than the Body Text (see Below), but generally around the 24 to 36pt size.

Titles and Sub-Titles should be given a clear colour difference to the main text of the poster, and it should be a colour that coordinates with your posters overall colour scheme.

6.c. BODY TEXT

Body Text can be tricky to scale – we recommend 20pt upwards to 24pt depending on space. If you think that the text should be smaller than 20pt because you have too little room on your poster, then that is a possible sign that you have too much text on the poster to begin with, and you should consider either editing the text or checking whether it is possible to create a poster bigger than the standard size to create more room.

References and Acknowledgements need not be very large font sizes, as little as 14 to 16pt will be acceptable.

We will now add the sub-titles and body text



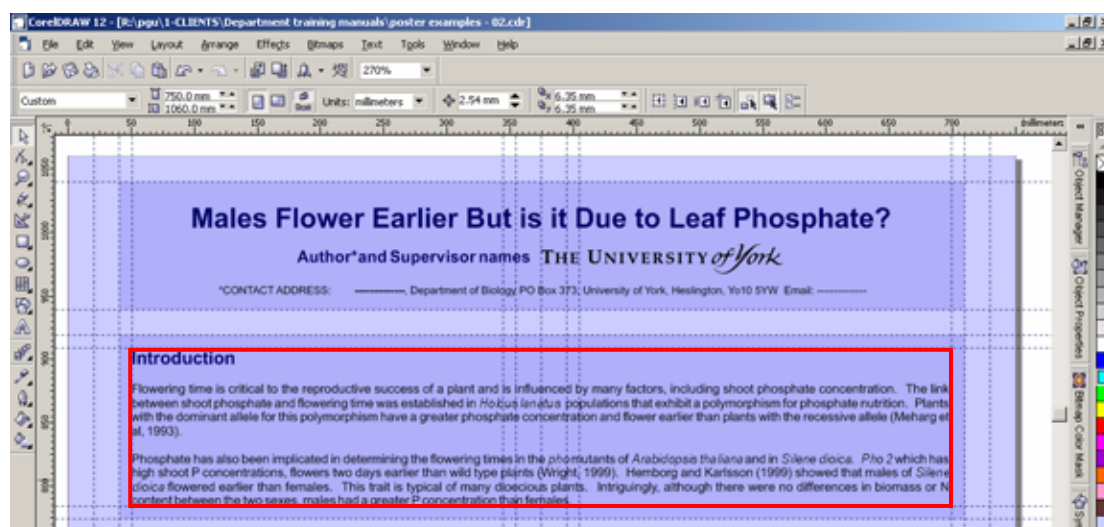
1. We will need to work in small sections, so that we can position the text in the correct areas of the poster. From the WORD document (poster text) copy the Introduction sub-title and paragraphs:

'Introduction...' - to - '... concentration than females.'

2. Move to the Corel Draw software, using the 'Text' tool, 'Click and drag' in a clear area of the pasteboard. (Again just to avoid clicking on any other object and altering its status.)

You will see a Text box being drawn, pull it into a long rectangle, and then click once inside it to see the cursor appear. Paste the text which you have copied from WORD. You will now have an easily editable block of text constrained by the text box. Do not worry about the visible edges of the text box, they will not print, they are there to make it easy to manipulate the text block. You can use the 'Pick' tool to maneuver the block, and some editing capabilities for the overall block (always be aware of the context sensitive menu). To Edit small amounts of text within the block, select the text with the 'Text' tool and apply changes from the menus.

3. Move this text block and shape it with the 'Pick' tool so that it fits within the second section box of the poster. Make sure that it fits the guides we have drawn.



The font size of for the sub-title is 40pt and the font size for the Introduction text is 28pt, the rest of the body text is 24pt.

Use this method to add the rest of the document text. Use the following diagram as a guide.

Males Flower Earlier But is it Due to Leaf Phosphate?

Author*and Supervisor names

*CONTACT ADDRESS: -----, Department of Biology PO Box 373, University of York, Heslington, Yo10 5YW Email: -----

Introduction

Introduction text only is 28pt

Flowering time is critical to the reproductive success of a plant and is influenced by many factors, including shoot phosphate concentration. The link between shoot phosphate and flowering time was established in *Holcus lanatus* populations that exhibit a polymorphism for phosphate nutrition. Plants with the dominant allele for this polymorphism have a greater phosphate concentration and flower earlier than plants with the recessive allele (Meharg et al, 1993).

Phosphate has also been implicated in determining the flowering times in the *pho* mutants of *Arabidopsis thaliana* and in *Silene dioica*. *Pho 2* which has high shoot P concentrations, flowers two days earlier than wild type plants (Wright, 1999). Hemborg and Karlsson (1999) showed that males of *Silene dioica* flowered earlier than females. This trait is typical of many dioecious plants. Intriguingly, although there were no differences in biomass or N content between the two sexes, males had a greater P concentration than females.

Aims

Sub titles are 40pt text is 24pt

The present field study asks three specific questions:

1. Do males flower earlier than females in *Silene dioica*?
2. Do males have greater leaf phosphate concentrations than females?
3. Is leaf phosphate related to flowering time?

Methods

- 60 plants were marked along a transect
- Leaf samples were taken from the plants at regular intervals before flowering, and on the date of first flowering of each plant.
- Phosphate analysis was done on the leaf samples.
- Time of first flowering was recorded. First flowering was taken as first fully opened flower.

Results

1. Do Males Flower earlier than females?

- Yes
- Figure 3 demonstrates that males flower earlier than females and that the first flowering time of the males is spread over a longer time period than the females.

Fig 2. First flowering time of male and female *Silene dioica* plants. (One-way ANOVA $F_{1,49} = 6.73$, $P = 0.01$). Time taken as time after first plant flowered.

2. Do Males have a great leaf phosphate concentration than females?

- No
- Figure 3 shows that males do not have a greater leaf [P] at flowering.
- In the weeks leading up to flowering there is no difference in leaf [P] either (data not shown).

Fig 3. [P] at time of flowering for males and females of *Silene dioica* (one-way ANOVA $F_{1,49} = 0.732$, $P = 0.397$).

3. Is leaf Phosphate related to flowering time?

- Possibly!
- Figures 4 and 5 show that there is a difference in the relationship between leaf phosphate and flowering between males and females.

Fig 4. Phosphate concentration in leaves at flowering vs flowering time for male *Silene dioica* plants (linear regression $F_{1,24} = 3.65$, $P = 0.068$).

Fig 5. Phosphate concentration in leaves at flowering time vs flowering time for female *Silene dioica* plants (linear regression $F_{1,20} = 4.65$, $P = 0.042$).

- However, it is not conclusive that there is a true relationship between flowering time and leaf phosphate concentration in either males or females.

Labels and figure legends are 20pt and blue

Conclusion

This study has demonstrated so far that:

- Males flower earlier than females in the field.
- Males and females do not have a different leaf phosphate concentration.
- However, there is a different relationship between leaf phosphate concentration and flowering time.
- The positive relationship between flowering time and leaf phosphate is the opposite of the expected result.

Further Work

- Further exploration of data is needed to gain a fuller understanding as to the relationship between flowering time and leaf phosphate concentration in the different sexes.
- Phosphate concentrations of whole plant biomass would be required to gain a greater understanding of its relationship with flowering time.
- Lab based investigations on both *Arabidopsis thaliana* and *Silene dioica* will hopefully lead to a greater understanding of the affect phosphate has on flowering.

References and Acknowledgements are 20pt

1. Hemborg A.M., P.B. Karlsson (1999). Sexual differences in biomass and nutrient allocation of first-year *Silene dioica* plants. *Oecologia* **119**: 453-460.
2. Meharg A.A., G.J. Cumber, M.R. Macnair (1993). Pre-adaption of Yorkshire Fog, *Holcus lanatus* L. (Poaceae) to arsenate tolerance. *Evolution* **47**: 313-316.
3. Wright W. (1999). Reproductive biomass and mycorrhizal colonisation in grass populations polymorphic for phosphate uptake kinetics. PhD thesis, Univ. York.

Acknowledgements
This work was funded by the bbsrc
xxxxxxxxxxxxxxxxxxxx for helping with the collection of data in the field.

7. ADDING IMAGES AND LOGOS

Images are independent objects within the document. To add them, you can copy and paste from PowerPoint or WORD, but this can have problems when printing, either the resolution isn't good, or the images can become corrupted. Original files should be used when possible. The normal image file types are Tiff, Jpeg, PNG, EPS, and GIF (GIF can be very low resolution and should only be used when that particular image comes in no other file type. Collect all the images you need for your poster together and have them easily accessible.

For this example the images are available to collect from: <http://www.york.ac.uk/biology/graphics/training.htm>
Select them from the list on the web page and save it to an easily accessible personal file space.



To import an image into your document:



1. Select from the main menu, File| import. Using the dialogue box that appears, navigate to the area where you have saved the image files from the web page.
2. Select the first image to add to the document – treeLinedPath.jpg and click 'Import'. You will see that the mouse icon changes to an import icon and the name of the file and details are displayed next to it. When you next click on your document, this is where the image will be placed.
3. You can use the Pick tool to move and scale the image. To change its scale, select it with the 'Pick' tool, the corner anchors will be visible. Click and drag on a corner anchor, always holding down the shift key on your keyboard to constrain its proportions – otherwise you will stretch the image out of its natural shape.



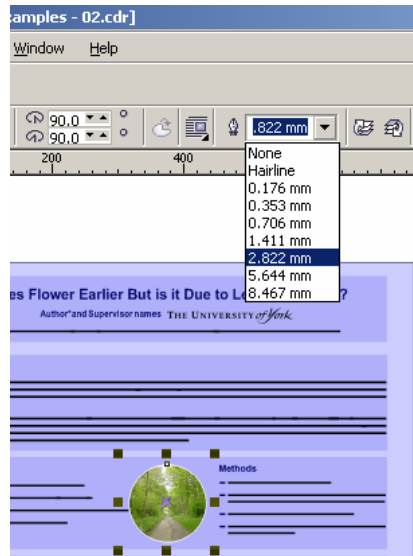
Anchor points for scaling the image

4. With need this image to be 185 x 117 mm. We are also going to fit it into a 'Circle mask'.
Using the 'Ellipse' tool  draw a circle in a space near the imported image, hold down the Ctrl key on your keyboard while drawing the circle to constrain its proportions, also pay attention to the context sensitive menu to make sure you can draw a circle and not an arc or segment.  The circle should measure 117mm x 117mm.
5. Making sure you can see both the image and the newly drawn circle, select the image with the 'Pick' tool, then select from the main menu 'Effects|Powerclip|Place inside container'. Your mouse icon will turn into an arrow; use this by clicking on the edge of the circle. The image will be clipped into the circle, and the two are now a joined object.



We can edit this shape further by selecting it with the 'Pick' tool, hold down the Alt key on your keyboard and select a colour from the swatch. Choose White.

With the object still selected, use the option on the Context sensitive menu to make the outline thicker, let's use 2.882mm.



6. Now place the image between the Aims and Methods Text areas, use your own judgment to make sure it is composed well within the space.
7. Import and place the remaining images using the following diagram as a guide. The male / female flower images are clipped into squares, and the chart images are not.

Males Flower Earlier But is it Due to Leaf Phosphate?

Author*and Supervisor names THE UNIVERSITY of York

*CONTACT ADDRESS: Department of Biology PO Box 373, University of York, Heslington, Yo10 5YW. Email:

Introduction

Flowering time is critical to the reproductive success of a plant and is influenced by many factors, including shoot phosphate concentration. The link between shoot phosphate and flowering time was established in *Holcus lanatus* populations that exhibit a polymorphism for phosphate nutrition. Plants with the dominant allele for this polymorphism have a greater phosphate concentration and flower earlier than plants with the recessive allele (Meharg et al, 1993).

Phosphate has also been implicated in determining the flowering times in the *pho* mutants of *Arabidopsis thaliana* and in *Silene dioica*. *Pho 2* which has high shoot P concentrations, flowers two days earlier than wild type plants (Wright, 1999). Hemborg and Karlsson (1999) showed that males of *Silene dioica* flowered earlier than females. This trait is typical of many dioecious plants. Intriguingly, although there were no differences in biomass or N content between the two sexes, males had a greater P concentration than females.

Aims

The present field study asks three specific questions:

1. Do males flower earlier than females in *Silene dioica*?
2. Do males have greater leaf phosphate concentrations than females?
3. Is leaf phosphate related to flowering time?



Methods

- 60 plants were marked along a transect.
- Leaf samples were taken from the plants at regular intervals before flowering, and on the date of first flowering of each plant.
- Phosphate analysis was done on the leaf samples.
- Time of first flowering was recorded. First flowering was taken as first fully opened flower.

Results

1. Do Males Flower earlier than females?

- Yes
- Figure 3 demonstrates that males flower earlier than females and that the first flowering time of the males is spread over a longer time period than the females.

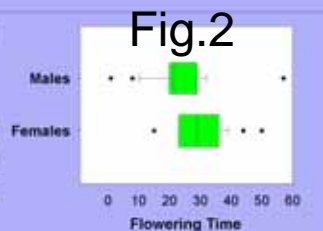


Fig 2. First flowering time of male and female *Silene dioica* plants. (One-way ANOVA $F_{1,58} = 6.73$, $P = 0.01$). Time taken as time after first plant flowered.

2. Do Males have a greater leaf phosphate concentration than females?

- No
- Figure 3 shows that males do not have a greater leaf [P] at flowering
- In the weeks leading up to flowering there is no difference in leaf [P] either (data not shown).

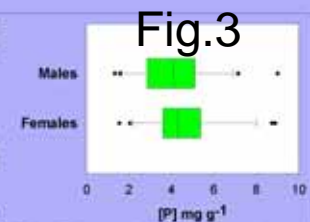


Fig 3. [P] at time of flowering for males and females of *Silene dioica* (one-way ANOVA $F_{1,58} = 0.732$, $P = 0.397$).

3. Is leaf Phosphate related to flowering time?

- Possibly!
- Figures 4 and 5 show that there is a difference in the relationship between leaf phosphate and flowering between males and females

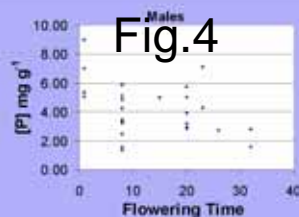


Fig 4. Phosphate concentration in leaves at flowering vs flowering time for male *Silene dioica* plants (linear regression $F_{1,24} = 3.65$, $P = 0.068$).



Male *Silene dioica* flower



Female *Silene dioica* flower

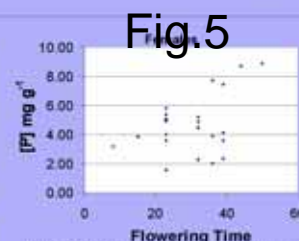


Fig 5. Phosphate concentration in leaves at flowering time vs flowering time for female *Silene dioica* plants (linear regression $F_{1,20} = 4.65$, $P = 0.043$).

- However, it is not conclusive that there is a true relationship between flowering time and leaf phosphate concentration in either males or females

Conclusion

This study has demonstrated so far that:

- Males flower earlier than females in the field.
- Males and females do not have a different leaf phosphate concentration.
- However, there is a different relationship between leaf phosphate concentration and flowering time.
- The positive relationship between flowering time and leaf phosphate is the opposite of the expected result.

Further Work

- Further exploration of data is needed to gain a fuller understanding as to the relationship between flowering time and leaf phosphate concentration in the different sexes.
- Phosphate concentrations of whole plant biomass would be required to gain a greater understanding of its relationship with flowering time.
- Lab based investigations on both *Arabidopsis thaliana* and *Silene dioica* will hopefully lead to a greater understanding of the affect phosphate has on flowering.

1. Hemborg A.M., P.S. Karlsson (1999). Sexual differences in biomass and nutrient allocation of first-year *Silene dioica* plants. *Oecologia* 118:453-460
2. Meharg A.A., Q.J. Cumbes, M.R. Macnair (1993). Pre-adaption of Yorkshire Fog, *Holcus lanatus* L. (Poaceae) to arsenate tolerance. *Evolution* 47:313-316
3. Wright W (1999). Reproductive biomass and mycorrhizal colonisation in grass populations polymorphic for phosphate uptake kinetics. PhD thesis, Univ. York.

Acknowledgements
This work was funded by the bbsrc
xxxxxxxxxxxxxxxxxxxx for helping with the collection of data in the field.



We will now add logos to the poster. Logos to consider are your host institution and funding bodies. On this poster we are adding logos for the University of York and the BBSRC.

For this example the logos are available to collect from: <http://www.york.ac.uk/biology/graphics/training.htm> and also at [t:/resources/ptr2/phd poster training](t:/resources/ptr2/phd%20poster%20training).


Select the 'logos.pdf' file from the list on the web page and save it to an easily accessible personal file space.

Logos are image files and have the same file formats: Tiff, Jpeg, PNG, EPS. For this exercise they are available in a single PDF file.

To import the logos into your document:



1. Select from the main menu, File|Import. Using the dialogue box that appears, navigate to the area where you have saved the logo.pdf file from the web page. Select this file and click import. The mouse icon will turn into a placement icon for imported objects. Click on a blank space in the 'Pasteboard'. The logos will appear as a grouped object.
2. The grouped object contains the two logos, The 'University of York' Logo and the 'BBSRC' logo. Use the 'Pick' tool, Select the logos, then click on the 'Ungroup' icon that appears in the

context sensitive menu area . This will ungroup every part of the logos, so we need to regroup them individually to make them easier to manage. Click and drag on a space toward the top right corner of the University of York logo, you will see a 'selection lasso' being drawn, this lasso must encompass the whole logo to select it, if your lasso is cutting through the logo, start again but arrange it so that the lasso surrounds the logo without cutting into it. When the lasso has surrounded the logo release the mouse button and the logo should be highlighted as a selected object.



Group icon

Click and drag selection lasso



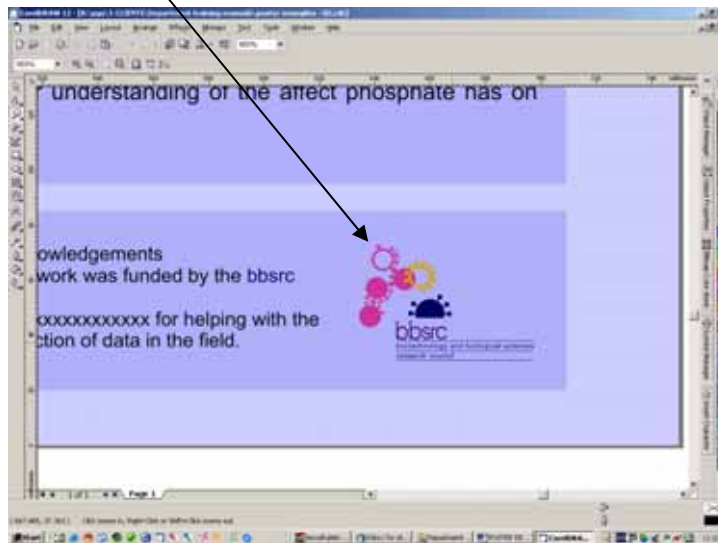
Click on the Group icon (shown above).

Use the same method to regroup the BBSRC logo.

3. Use the 'Pick' tool to place the University of York logo in a space near the poster title. If needed move the Author names to the left to create a space.




5. Now use the same method to place the BBSRC logo at the foot of the poster, see diagram for reference.



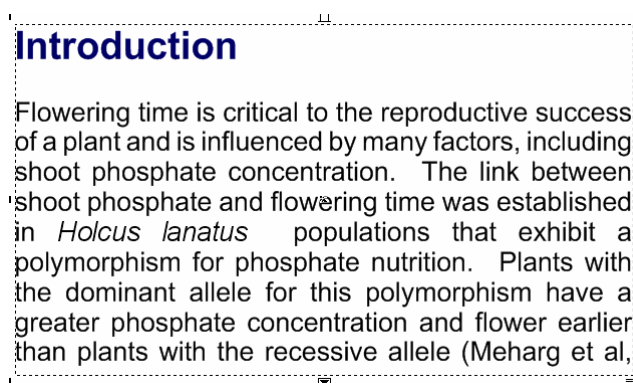
8. FINAL CHECKS

These are just a few notes which you should take into consideration or apply when you are creating a poster in a real life situation.

- 1) Once you have finished the layout of your poster, allow yourself a break, then come back to the file and using the 'Zoom' tool  make sure all the columns, text boxes, margins, images and logos are as well placed and aligned as possible.

If the guides are obscuring your view, un-tick the View|Guidelines option.


In particular make sure that text within text boxes is fully visible – a text box can hold more text than is actually visible, and this is signified by an arrow icon in the bottom central handle (select with 'Pick' tool to make anchors and handles visible).



Selected text box with handle and arrow icon

Use the 'Pick' tool to pull/stretch the handle downward to allow all text to be visible.

Also make sure that text boxes, Images and Logos are not overlapping each other unless desired.

- 2)  **NATURAL DISASTERS** - Save a copy of your poster onto an external area or media (memory stick, CD or network) as computers can always fail, crash, or even be stolen. – Hard drives have been known to fail losing all data at the most inopportune moments. Always keep these backups up-to-date with any last minute changes.
- 3) If you are unsure about how the colours you have chosen will print, contact your printer for advice and a proof print.
- 4) If you think you need expert advice on the layout/design, contact help (boil-graphics@york.ac.uk - Tel 328729, as soon as you can to allow time to make changes.
- 5) Have your supervisor and colleagues proof read your poster for you to check for typo's, whether your information is scientifically correct and whether your design is acceptable to the a general audience.
- 6) Always allow time to get an A4/A3 proof from the printer, and to make any changes this might highlight.

1.	Planning your poster	23
2.	Creating and saving the Corel Draw file	23
3.	Background design	24
	a. Corel Trace and Colouring	24
	b. Placement including: Shaping-Trimming / Welding / Intersecting	28
4.	Adding Titles and Text	30
	a. Advanced text formatting	31
	b. Fonts / Converting to curves	31
5.	Adding Images	32
6.	Final checks	21
7.	Printing	32
8.	Saving the document	33
9.	Exporting File Types (PDF)	33



This part of the booklet is a general guide and any examples are for you to follow at your discretion. In this section the author assumes you have at least some basic experience of using Corel Draw for either illustrating or page layout. If you come across a reference to a technique you are not familiar with, it will be covered in the first section of this booklet on 'basic poster design'.

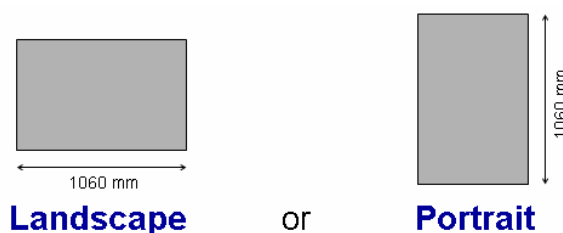
The term 'Advanced' poster design is used loosely here. Good design improves the audience's experience of your poster, but whether it is basic or advanced isn't important so long as it is clear. The two examples in this booklet are no better than each other; they just employ different techniques and both have their value. We will cover a few of Corel Draw's many abilities to enhance the design created in the 'basic poster design' in section 1.

1. PLANNING YOUR POSTER

Consider the purpose of the poster and whether the audience will be attracted to a particular type of design.

Always check where the poster will be displayed and whether there are any restrictions on size and orientation.

Ideas for design can be found from many sources: magazine layouts and adverts; web page design; shop displays; scientific journals, manufacturer's catalogues and even other people's posters.



Check your deadlines and availability of your printer/print shop before you start.

2. CREATING AND SAVING A COREL DRAW FILE

The next step is to start working with Corel Draw. The software is available on the Teaching computers within the department, via the Novel Network application launcher – or in some cases from the 'Start' menu of those computers. To use the Novel Launcher:



If the Novel application launcher is not available on screen by default when you log in, follow these instructions

1. Click on your start menu – navigate to and select: Programs|Start up| Application Launcher
2. In the left window select 'Graphics'
3. In the right window double click on the 'Corel' folder
4. Double click on the 'Corel Draw' icon
5. This will either install the software or start the software for use.
6. Once you have the Corel Draw software open on your computer, open the following file:

poster_advanced_example.cdr

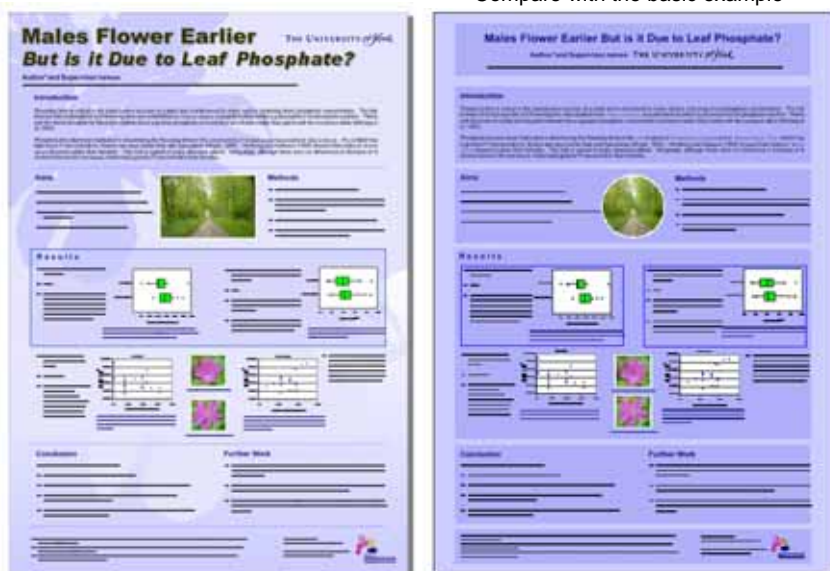
Compare with the basic example

For the following exercises all the text and images can be found at this web address:

<http://www.york.ac.uk/biology/graphics/training.htm>

and

T:/resources/ptr2/
PhD Poster Training/



There isn't a great deal of difference in the way the text is set on the advanced poster, it has received a little bit more consideration which will be covered later. The main changes are to the background and consideration of the most graphically attractive point of the poster; its photographic content. The amount of text involved in this poster restricts the use of large images, so the background has been adapted to enhance the overall design. Keeping the design clean and unfussy is a priority. The colour scheme is simple, playing on the complementarity of blue and pink.



1. Save the example file to an accessible location (your own personal work area).
2. Make sure you have copies of the following reference files, which are available from:

<http://www.york.ac.uk/biology/graphics/training.htm>

or T:/resources/ptr2/PhD Poster Training/

- poster_advanced-example.cdr
- poster_advanced-example-02.cdr

3. BACKGROUND DESIGN

Posters can have quite decorative backgrounds:

1. One opinion is that 1 simple flat colour used to cover the whole of the background makes for the clearest and easiest to read poster;
2. The poster background can be divided into geometric shapes: rectangles; squares; circles or ellipses; and also divided by diagonals, to suit the flow of the text;
3. Another choice is to use one relevant image scaled to cover the whole or partial area of the background of the poster. This choice demands good design skills so that you are able to display the poster text over this image in a way that doesn't detract from the background, and at the same time stands out enough to be read easily;
4. You can also use an image to create a vector shape, which can then be used with simple colour to enhance the background.

3.a. COREL TRACE AND COLOURING


Corel Draw is part of a graphics suite which includes Corel Trace. Trace has a simple function, which is to scan bitmap images and create a vector copy. Trace can be opened independently from Draw or directly from within the Draw application.

This software may or may not be installed on the computer or network you are using, if not, follow this next exercise from point 10. To find out if Corel Trace is on your system follow point 1.

For our current tutorial Trace is used to scan a flower image from the poster and use the vector output to develop the background of our poster.

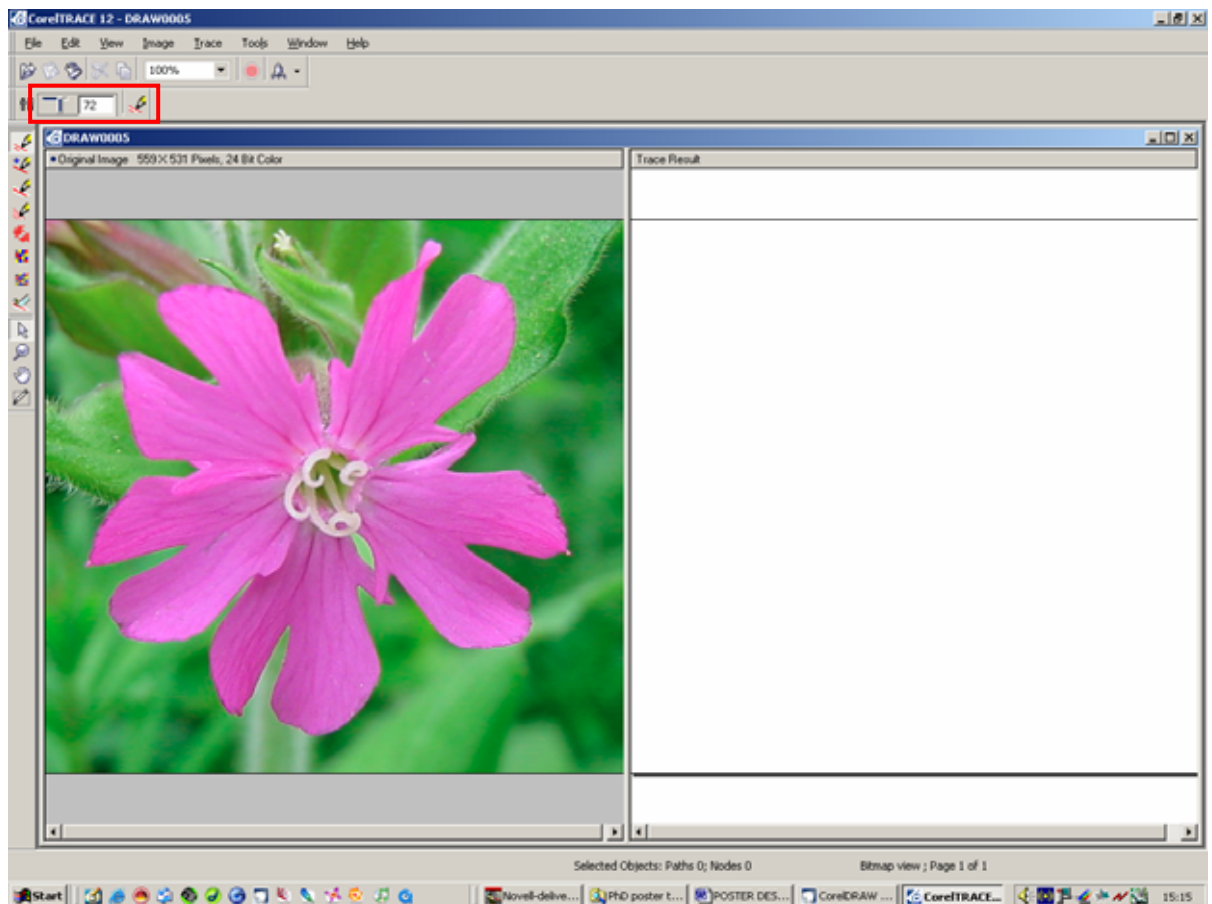
In the file 'poster_advanced-example.cdr' we have a column of images down the right hand side. The top image is a bitmap, the 2nd is a Trace of the first, the third is the trace without the background colour, and finally the fourth image is the trace image simplified into a single vector shape, which we can use in our design.



1. Using the 'Pick' tool  select the top bitmap image. Then select from the main menu Bitmaps|Trace Bitmap. This will either launch the image into the Corel Trace application. Or it will launch the application and you will need to open the image we are going to edit within Trace. Use File|Open and navigate to 'T:/resources/ptr2/phd training/' and select 'Male_Silene_dioica_flower.jpg' or retrieve the file from the web and open from your personal space.

(If Corel Draw doesn't give you the option to 'Trace bitmap' that is because on your current system this part of the Corel design suite isn't available – follow from point 10).

2. Corel Trace has a two window interface; on the left is the bitmap image and on the right is the trace result window. On the 2nd horizontal toolbar is an 'Accuracy' slider and 'Do Trace' button.



The other useful tools are the 'Pick' and 'Zoom' tools. The 'Zoom' tool is particularly useful so you can see the quality of either the bitmap or the trace result.

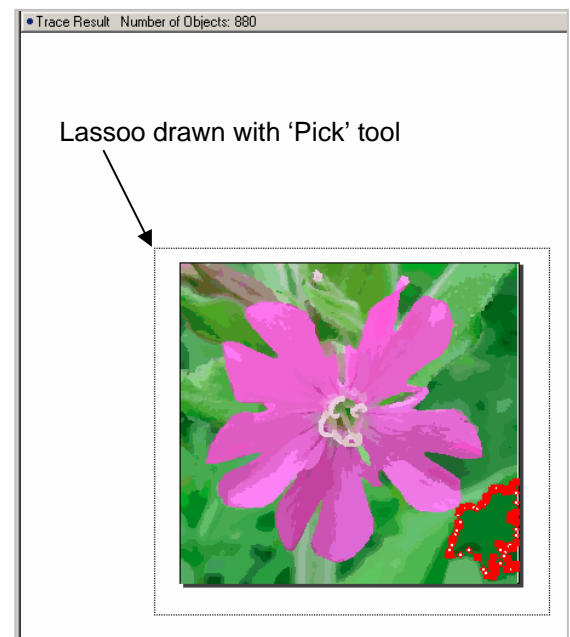
3. Be warned that applying a trace to a bitmap at high (100) accuracy will lock up the resources of your computer (depending on its ability).

Experiment with the accuracy setting and click on the 'Do Trace' button. See how varied the results can be (in the right window).

For our task we need a low to medium setting. As the result we require is for a simple outline shape with a small amount of detail in the centre of the flower. Set the 'Accuracy' to 37 and Click 'Do Trace'.

4. To Get the result into Corel Draw, we have two options: we can 'File|Save Trace' – save as a .CMX file, which can be opened by Corel Draw, or we can Copy and Paste the result from Trace directly into Draw (the easy option).
5. Use the 'Zoom' tool to zoom out of the Trace result window, just enough so that you can see the whole image with white space around it.
6. Use the 'Pick' tool, and click on part of the image in the Trace result window. It should highlight that part of the image with red outlined blocks (Nodes). This is a necessary action to make the window and selection ability work.
7. Now use the 'Pick' tool to click in the white space around the image and draw a lasso around the whole picture. This will select the whole content of that window (though it may not look like it).

8. Now that the whole image is selected, select Edit|Copy from the main menu.
 9. Now move back to Corel Draw and the poster. Edit|Paste the image into the poster file.
- This may take a few extra seconds to apply.



10. Once we have the trace result pasted into the poster file, we can begin to edit it for our purpose.
- Use the 'Pick' tool to move the trace result flower into the Paste Board so there is plenty of white space around it. The object is grouped, to ungroup it, Right click your mouse on the image and select 'Ungroup' from the menu list.



Now begin deleting all the coloured objects around the outside of the flower (greens and khaki colours), be careful not to delete any of the pink and mauve of the main petals.

You should be left with something that looks like the example here on the left.

11. Draw a lasso around the whole flower with the 'Pick' tool, so all the individual remaining parts are selected together. Choose a colour from the Swatch (right of screen) and click on it to apply it to the whole flower shape. The hold down the 'Alt' key on your keyboard and select an outline colour 'White' from the swatch.
12. With the whole flower still selected, make sure it is ungrouped - right click and select 'Ungroup' if available; this allows us to perform other options.

Select from the main menu: Arrange|Shaping|Simplify – this may take a few moments, be patient.

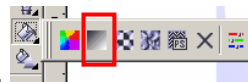
Then right click on the whole flower again and select 'Combine' from the menu list.

This leaves us with a single shape that we can use as a coloured stencil or trim device.

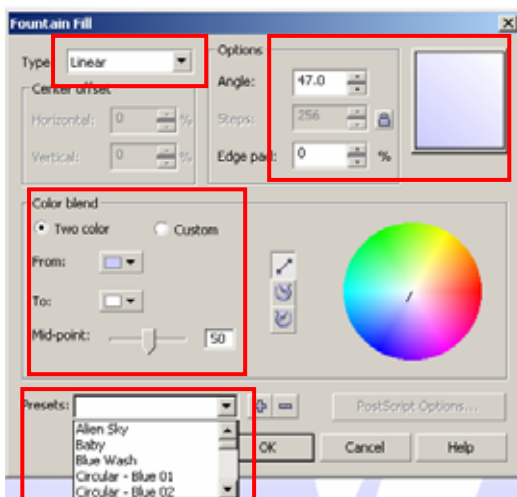
13. The final option is to change its outline setting to suit yourself, we can either have no outline, or a varying of thicknesses depending on your design ideas. Altering the Outline and Fill colours can enhance your design.



Other differences in this advanced poster example compared to the basic poster example are the use of 'Gradient Fills' on background shapes. I have used the flower stencil shape to trim some drawn rectangles, added gradients and then I have stacked them on the poster background to add more dimensions to the design. Using shapes for trimming is covered in section 3b.



'Gradient Fills' can be applied to any shape using the Gradient Fill tool. Select the shape you wish to edit. Click on the 'Gradient Fill' bucket and use the dialogue box that opens.

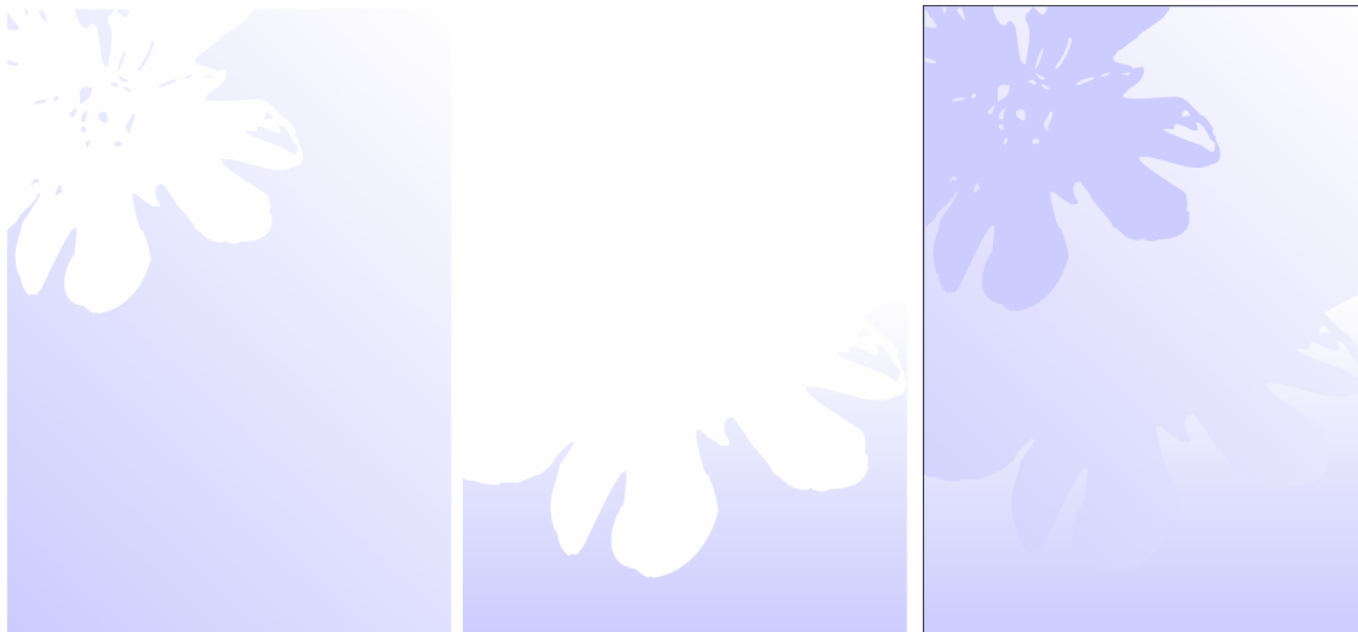


The highlighted areas show that you can:

- Set the Type: radial or linear.
- The angle and edge pad control direction and density.
- Colour blend; either two colour or multi-coloured as well as balancing the mid-point.
- Presets have some very good gradients to speed design, cylinders etc.

Select your choice, apply OK and the gradient will fill the selected shape. If at any point you want to edit this gradient, select the shape and then double click on the 'Fill' description window bottom right of your screen.





Example rectangle shapes after being trimmed (see 3b) and gradients applied.

The finished effect.

3b. Placement including: Shaping-Trimming / Welding / Intersecting

Placing the flower object on the background of your poster will require consideration, and may require you to edit the shape further to fit a corner of the poster.

When working with shapes that have taken some effort to prepare, make sure you keep copies of various stages of its development, place them in the Paste board area for later use, or keep a separate file with copies in.



1. Place the flower stencil over the corner of the poster (or new file if you need a clean area to work), and scale it until you think it's the size you want. You may be left with parts of the stencil that overhang the edges of the poster.

(this is not helpful when it comes to printing from Corel Draw – when using the 'Scale to Fit' option when printing, the software takes everything that is on the Paste board and scales that into the print window, adding areas that you'd rather were not visible).

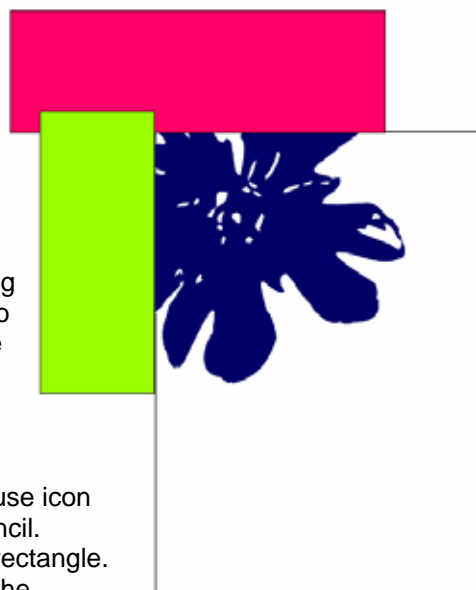
To get rid of these unwanted overhangs we will use rectangles to trim off the excess.
See diagram.

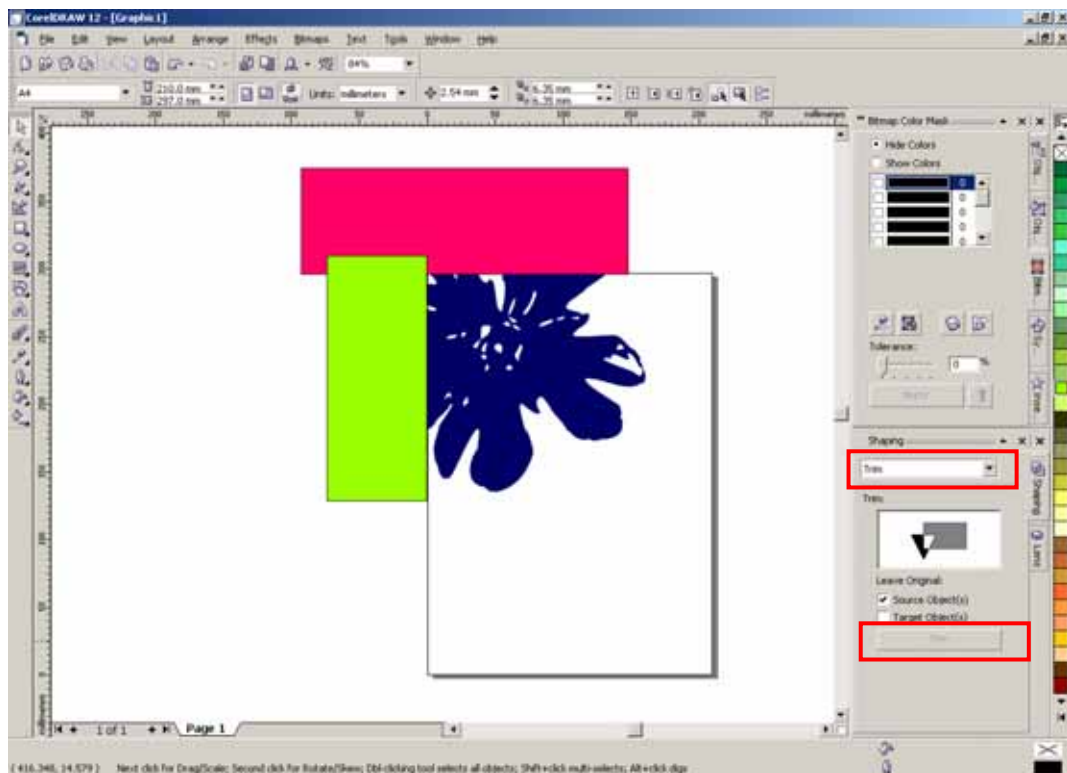
2. Draw two rectangles and place as shown.

3. Select the top rectangle, then select from the main menu Arrange|Shaping|Shaping

this will open the 'Shaping Docker' on the right hand side of your workspace. (Diagram following page). You may need to arrange the Dockers so that you can see the options clearly. Stretch the lines between the Dockers.

4. With the top rectangle still selected, on the Shaping Docker choose 'Trim' from the drop down menu, click on the 'Trim' button, your mouse icon will change, use this and click on the flower stencil. The Trim will apply and you can delete the top rectangle. Follow the same method to trim the left side of the flower stencil.





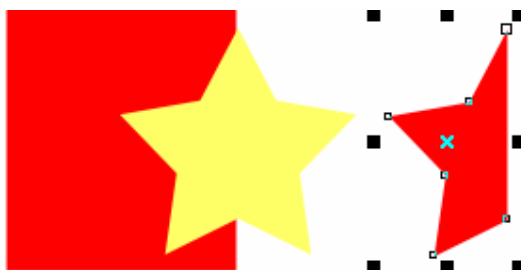
Copy the new shape onto the poster file 'poster_advanced-2.cdr' and place in the background.

Use the 'Arrange|Order|To Back' option from the main menu. You can use the 'Shift' or 'Ctrl' keys on your keyboard at the same time as pressing the 'Page up' or 'Page down' keys to move selected objects up and down in the stacking order of objects. Alternatively you can use the Object Manager Docker available by selecting Window|Dockers|Object Manager. This will open on the right of your workspace and if you expand 'Page 1 | Layer 1' you can click and drag objects up and down the stacking order.

The Shaping Docker can be used to Trim, Weld or Intersect selected objects. 'Trim' as we have seen will use Objects to cut into other objects. 'Weld' will join objects together; useful for creating tubes and other illustrational devices. 'Intersect' will generate a third shape from two used.

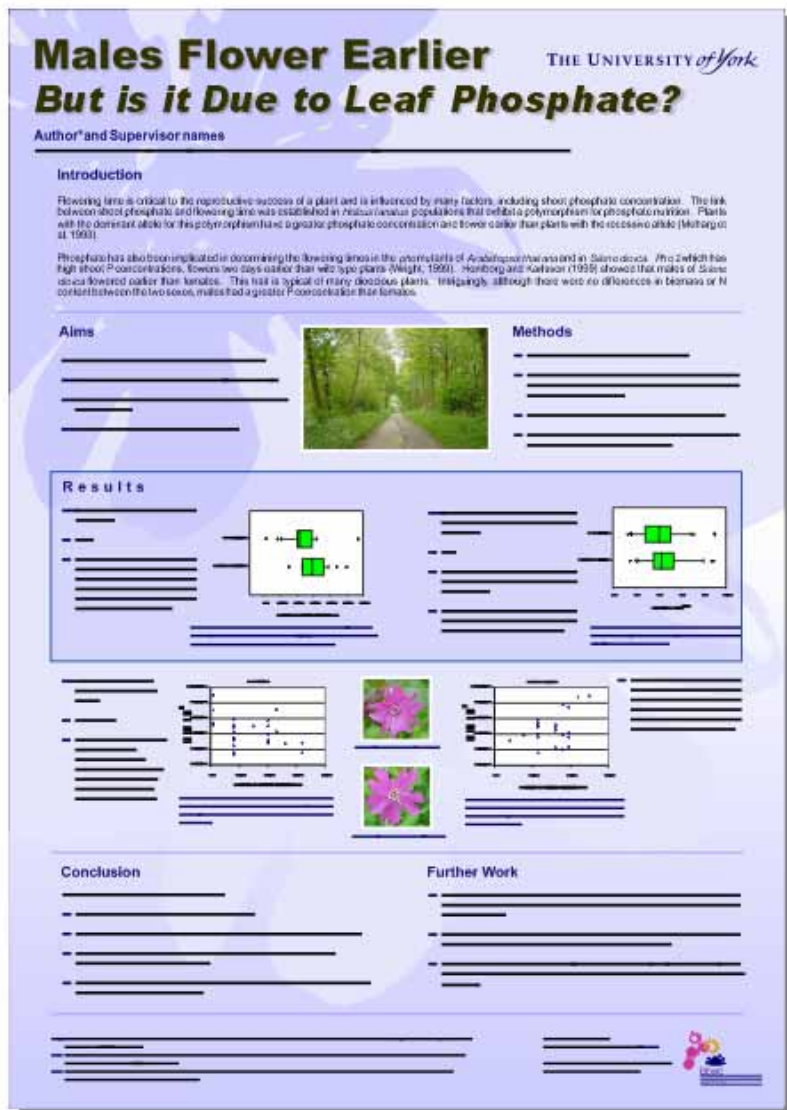


Weld these two shapes and the result is on the right.



Intersect these two shapes and you will generate the 3rd shape (seen selected). Look at point 3.a. and use the flower stencil shape to enhance the background

4. ADDING TITLES AND TEXT



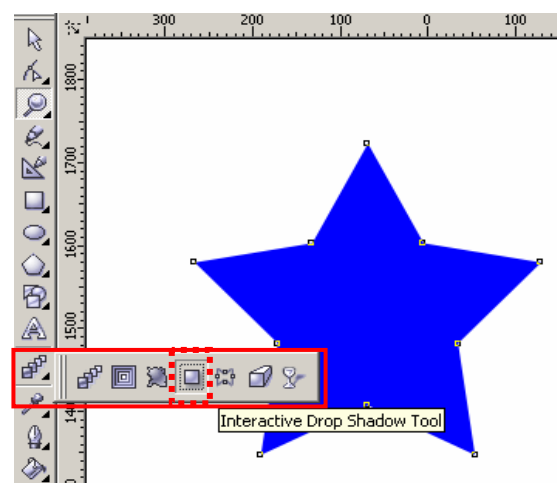
In this example the text is added mostly in the same format as explained in the Basic poster example see page 13. Except for the Title has been given a Drop Shadow and part of it has been italicized for effect.

Just to remind you that Titles should be as big as you can make them or within tasteful boundaries. Subtitles should be at least 28pt to 36pt. Body text should be no smaller than 24 point if possible. Image legends should be highlighted by a different colour or font to the main body text and can be 2pts smaller. References can be quite small at around 16pt.

To add a Drop Shadow:



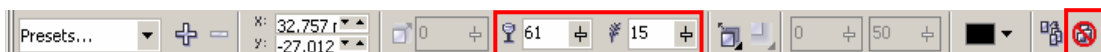
1. Using the 'Pick' tool, select the text or object you wish to apply the Drop Shadow to.
2. From the Tool Box, select the drop shadow tool.



3. This tool may load up with a default setting which we don't want to use, it can apply shadows from different points of the selected object. To set the type of shadow we want to use click on the 'Presets' drop down menu, found on the left of the context sensitive menu. Choose from the list: 'Flat Bottom Right', this will then apply to your selected shape or text.



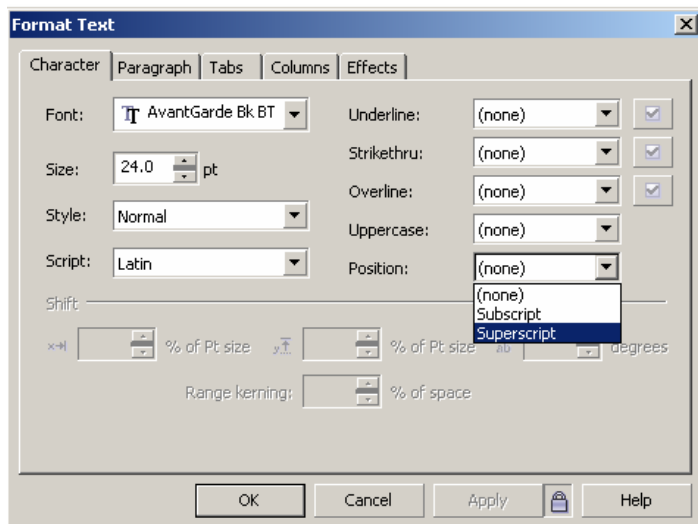
The shape will now have a shadow control arrow visible: you can click on this to alter the placement of the shadow (grab and drag the arrow); Click on the Slider to alter the Opacity of the shadow (also available on the context sensitive menu). On the context sensitive menu you can alter the amount of 'Feather' the edge of the shadow has; for a more crisp edge.



Left to right: Opacity and Feather settings, and on the end is the remove shadow option.

4.a. ADVANCED TEXT FORMATING

To fine tune text, you can use the following main menu option – 'Text|Format Text', which opens the following dialogue box. In this box from the Character tab you can select placement options e.g. superscript; change case; add highlights etc. The other important tab is the Paragraph tab, which allows you to set line and character spacing. On your Corel Draw file, select the text you want to change, then open this dialogue box and choose the option you wish to apply and click OK.



4.b. FONTS / CONVERTING TO CURVES

Whilst designing your poster, you may want to use unusual fonts, there are many available and some can be a good choice for the job in hand, rather than using the same fonts time and time again. These fonts may be only available to yourself on a personal laptop or computer and not available to your print shop. If the printer doesn't have the font you will either need to:

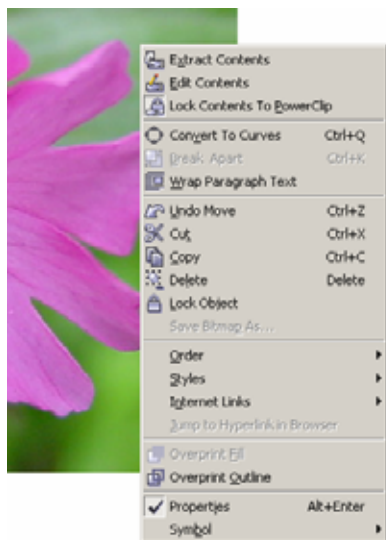
- A. Send the font file along with your design file to the print shop.
- B. When you save your design file, there is an option to attach fonts in the save dialogue box (not always reliable - can crash destination computer).
- C. Once your design is complete you can convert the 'text to curves' – This makes the text a drawing object/shape and relieves the need for a font file within the destination computer.

Select the text you want to convert to curves, then from the main menu select 'Arrange|Convert to Curves'.

The down side is that you cannot edit the text again afterward without retyping it. So only apply this method to a copy of the finished document.

5. ADDING IMAGES

In this advanced example there is no difference to how an image is imported and placed on the poster than that shown in the Basic example. See page 16, which also shows how to clip an image into a shape. However do note this menu which is available when you right click on an image that has been clipped into a shape.



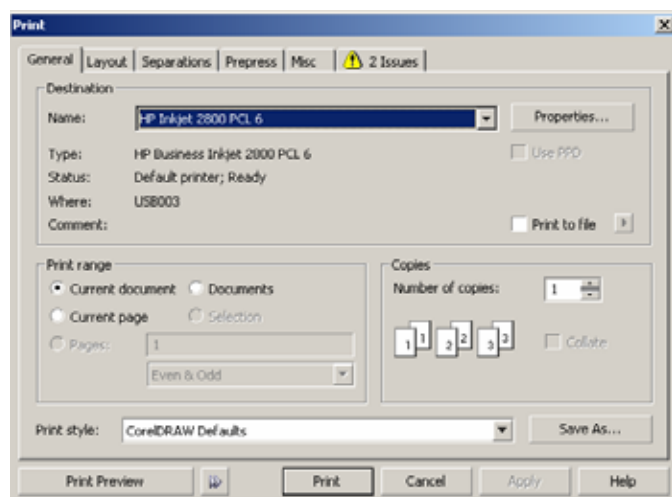
The options to Edit, Extract and Lock the content make it easy to manage this object. The Lock option is useful when cropping the image to your requirements, but you must remember to relock the image afterward.

6. FINAL CHECKS

See page 21.

7. PRINTING

You will need to proof print your poster, so that you can get a general idea what it may look like on paper, and also to get an idea of what the colours may look like when printed. Files from Corel Draw or indeed any design software can look very different when moved from one computer/printer to another. Always allow time to check the file on another system especially the computer of the print shop and print proof.



The print dialogue box has 5 tabs. The most relevant are:

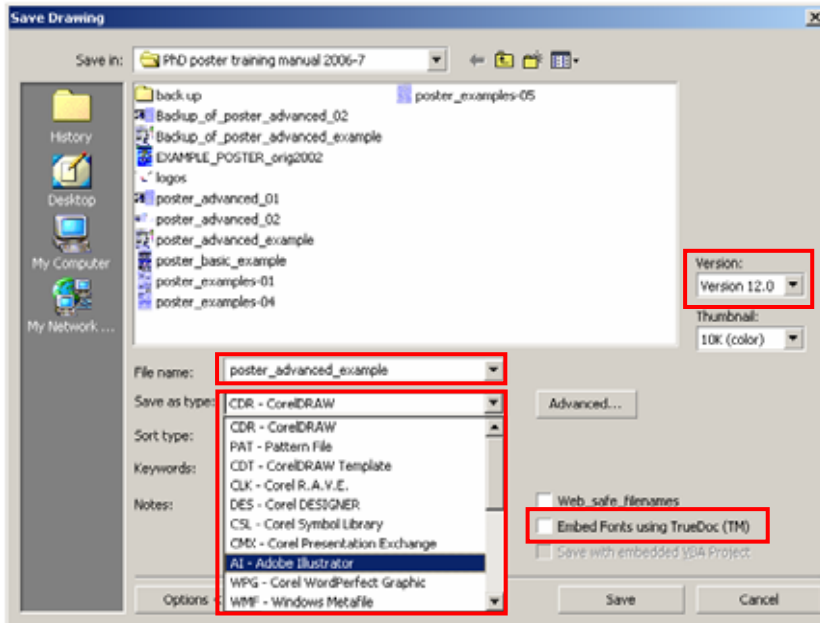
The 'General' tab, which allows you to set which printer to use and how many copies. The properties button allows you to access the print driver so that you can set orientation. If you have more than one document to print, you can select the 'Documents' radial button and add them to the current print list.

The 'Layout' tab is important as it gives you the option to 'Fit to Page', which you will need to do when printing a poster onto an A4 sheet for a proof.

The 'Misc' tab has an option at the bottom of the pane to allow Rasterizing the print image, which turns the print image into a picture. This can be necessary when the document has trouble printing because it is too complex.

The 'Issues' tab will give some necessary and unnecessary warnings about the print job, e.g. use of low quality images.

8. SAVING THE DOCUMENT



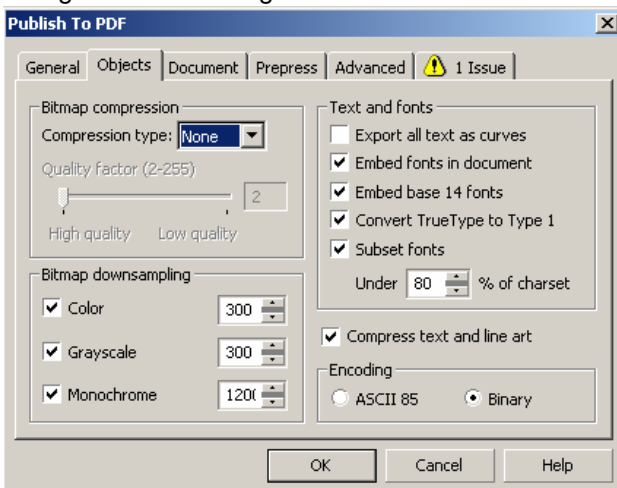
The 'Save' dialogue box has a couple of points worth noting.

- A. Give your file a name that is relevant, and if you are sending the file to a print shop make sure your name and contact email is part of the filename.
- B. You can save the file as other formats than Corel Draw (.cdr) such as Adobe Illustrator (.ai).
- C. Consider using the Embed Fonts tick box if you have used a font you think might not be readily available to your print shop. This is an alternative to converting your text to curves (see 4.b.) – This method is not always reliable, if edits are required after sending to the printer / print shop.

9. EXPORTING FILE TYPES (PDF and EPS)

To 'Export' EPS files for Print use, use the 'File|Export' feature from the main menu. You can be asked for these by publishers or journal editors, An EPS file is a scalable print file, which is also cross platform.

To Export a PDF file Corel has a set feature from the File menu: 'File|Publish to PDF'. This generates a dialogue box with general file saving information but also under the 'Settings' tab you can set the compression values. This is useful if you only want to export a draft copy (Low resolution) to email to colleagues for edit comments. Set the bitmap Downsampling to a low level e.g. 72 or 150 (This is measured in Dots Per Inch – DPI). For good print quality settings use 300DPI



The other important feature is the 'Export Text as Curves' tick box. This converts the files text into vector images and makes printing less fallible.

PDFs are generally uneditable. So always keep copies of the original Corel Draw poster file. Note that Adobe Illustrator can open PDFs for editing, but the text will be in a difficult to manage state. And some Fill effects may not render correctly.